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Comparison of postoperative outcomes between early and delayed cholecystectomy following the management of mild biliary pancreatitis

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Abstract

Introduction: Mild biliary pancreatitis (MBP) is a frequent cause of hospitalization. The optimal timing of cholecystectomy in these patients remains under investigation.

Objective: To compare postoperative outcomes between early and delayed cholecystectomy after MBP management.

Materials and Methods: A retrospective, observational, single-center study was conducted at Hospital General de Zona No. 20, IMSS, Puebla. 73 patients diagnosed with MBP between January and July 2024 were analyzed. Patients were divided into two groups based on surgery timing: early (<72 h) and delayed (>72 h).

Results: The delayed group showed higher rates of recurrent pancreatitis, postoperative complications, and hospital readmissions ($p < 0.05$). No deaths were recorded.

Conclusion: Early cholecystectomy showed fewer complications and hospital readmissions, making it a safe and effective surgical option for MBP patients.

Keywords: Mild biliary pancreatitis, early cholecystectomy, delayed cholecystectomy, postoperative complications

Introduction

Acute pancreatitis is characterized by a sudden inflammatory process of the pancreas and represents one of the most frequent gastrointestinal conditions requiring evaluation in emergency departments. This disorder is associated with systemic and metabolic dysfunction resulting from the release of digestive enzymes, toxins, and cytokines. In severe cases, it may progress to multiorgan failure. The clinical presentation of acute pancreatitis varies widely and, in severe cases, it is associated with significant morbidity and mortality [1]. In Latin America, incidence is reported to range between 9 and 15 cases per 100,000 inhabitants. Mortality in acute pancreatitis is primarily related to systemic inflammatory response syndrome (SIRS) and organ failure during the first two weeks of disease; after this period, mortality is mainly associated with sepsis and its complications [2].

The most frequent etiologies of acute pancreatitis include gallstone disease and excessive alcohol consumption. In most patients, the disease is mild, and management focuses on fluid resuscitation, analgesia, and early enteral nutrition, which generally results in clinical improvement. The most widely accepted classification system is the Revised Atlanta 2012 criteria, which divides the disease into early and late phases and categorizes severity as mild, moderately severe, or severe. Mild acute pancreatitis is defined by interstitial pancreatic edema without organ failure or local/systemic complications, and most affected individuals recover during the first week of treatment [3].

The management of mild acute biliary pancreatitis has evolved over time, with current recommendations favoring early and less invasive interventions. Clinical guidelines suggest performing early cholecystectomy, ideally within the first 72 hours of hospitalization or, if not feasible, within the first three weeks after symptom onset [3, 4].

Shmelev *et al.* conducted a retrospective study including 578,228 patients and found that omitting same-admission cholecystectomy in patients with mild biliary pancreatitis significantly increased the risk of hospital readmission due to recurrent pancreatitis, generating a considerable clinical and financial burden for both patients and the healthcare system [4].

Similarly, Khiali *et al.* carried out a prospective comparative study including 118 patients, evaluating early versus delayed cholecystectomy after mild-to-moderate acute biliary pancreatitis. The delayed cholecystectomy group presented a significantly higher rate of biliary complications (33%) compared with the early cholecystectomy group (1.8%) [5].

A meta-analysis performed by Walayat *et al.*, which reviewed 163 studies with a mean patient age of 43.8 years, supported early cholecystectomy as the preferred intervention in mild biliary pancreatitis, demonstrating shorter hospital stay, reduced operative time, and fewer biliary complications compared with delayed surgery [6].

Lastly, Blundell *et al.* analyzed 1,836 patients aged ≥ 50 years with mild acute biliary pancreatitis and found that delayed cholecystectomy was associated with higher rates of open cholecystectomy and emergency readmissions due to biliary disease [7].

Materials and Methods

An observational, retrospective, longitudinal, single-center study was conducted at Hospital General de Zona No. 20 of the Instituto Mexicano del Seguro Social (IMSS) in Puebla, Mexico. Patients aged ≥ 18 years with a diagnosis of mild biliary pancreatitis according to the 2012 Atlanta criteria, treated between January and July 2024, were included.

Patients with major comorbidities, severe pancreatitis, or age > 80 years were excluded. A total of 73 medical records were evaluated and categorized into two groups: early cholecystectomy (< 72 hours) and delayed cholecystectomy (> 72 hours).

Statistical analysis included Chi-square testing for categorical variables. SPSS version 25 was used for data processing. The study was approved by the Local Research Ethics Committee. All procedures were performed in accordance with national and international ethical standards.

Results

Age and Sex Distribution

In the present study, the early cholecystectomy group included 6 men and 30 women, with a mean age of 38.92 years (± 11.98). In the delayed cholecystectomy group, 4 men and 33 women were included, with a mean age of 43.32 years (± 13.18) (Table 1).

Table 1: Sex distribution, mean age, and standard deviation

Groups	Male	Female	Total	Mean age	Standard deviation
Early cholecystectomy	6	30	36	38.92	11.98
Delayed cholecystectomy	4	33	37	44.35	13.18

In the present study, the early cholecystectomy group included 6 males and 30 females, with a mean age of 38.92 years (± 11.98). In the delayed cholecystectomy group, 4 males and 33 females participated, with a mean age of 43.32

years (± 13.18). (Table 1).

Postoperative Complications

A total of eight postoperative complications were recorded. Postoperative pain occurred in 2.8% of patients in the early cholecystectomy group, compared with 2.6% in the delayed group ($P = 0.85$). Hepatic fluid collections were reported in 1.05% of patients in the early group and 1.52% in the delayed group ($P = 1.0$). No surgical site infections were reported in the early cholecystectomy group, whereas the delayed group presented an incidence of 1.52% ($P = 0.14$).

Postoperative ileus occurred in only one patient, exclusively in the delayed group ($P = 1.0$). Regarding hospital readmission, six cases (2.28%) were recorded in the delayed cholecystectomy group, while no cases were observed in the early group ($P = 0.042$).

One case of biliary colic (0.35%) was reported in the early cholecystectomy group ($P = 0.96$). Recurrent pancreatitis was documented in nine cases (3.42%) in the delayed cholecystectomy group ($P = 0.0065$). Conversion to open surgery occurred in six patients (2.28%) in the delayed group, with no conversions reported in the early group ($P = 0.042$) (Table 2).

Table 2: Postoperative complications.

Complications	Early cholecystectomy	Delayed cholecystectomy	P-value
Postoperative pain	8 (2.8%)	7 (2.6%)	0.858
Hepatic collections	3 (1.05%)	4 (1.52%)	1.0
Surgical site infections	0 (0%)	4 (1.52%)	0.14
Postoperative ileus	0 (0%)	1 (0.2%)	1.0
Hospital readmission	0 (0%)	6 (2.28%)	0.042
Biliary colic	1 (0.2%)	0 (0%)	0.96
Recurrent pancreatitis	0 (0%)	9 (3.42%)	0.0065
Conversion to open surgery	0 (0.0%)	6 (2.28%)	0.042

A total of eight postoperative complications were identified. Postoperative pain was reported in 2.8% of patients in the early cholecystectomy group, compared with 2.6% in the delayed cholecystectomy group ($P = 0.85$). The second variable analyzed was hepatic collections, which occurred in 1.05% of patients in the early group and 1.52% in the delayed group ($P = 1.0$). No surgical site infections were reported in the early cholecystectomy group; however, the delayed cholecystectomy group presented a rate of 1.52% ($P = 0.14$). Similarly, postoperative ileus was identified only in the delayed cholecystectomy group, with one reported case ($P = 1.0$).

Hospital readmission occurred in six patients (2.28%) in the delayed cholecystectomy group, whereas no cases were reported in the early cholecystectomy group ($P = 0.042$). One case of biliary colic was documented in the early cholecystectomy group ($P = 0.96$). Recurrent pancreatitis was observed in nine patients (3.42%) in the delayed cholecystectomy group ($P = 0.0065$). Conversion to open surgery occurred in six patients (2.28%) in the delayed cholecystectomy group, while no conversions were reported in the early group ($P = 0.042$). (Table 2).

Inferential analysis yielded a Chi-square value of 43.8 with a P value < 0.001 , indicating statistical significance (Table 3).

Table 3: Evaluation of Chi-Square Analysis for Postoperative Complications

	Value	Df	Asyntomatic significance
Chi-Square	43.8	8	0.001
Likelihood ratio	56.8	8	0.001
N of Valid Cases	73		

Within the inferential analysis, a chi-square value of 43.8 was obtained, with a P-value of <.001, indicating statistical significance.

Recurrence of Biliary Events

A total of nine cases (3.42%) of recurrent biliary pancreatitis were recorded in the delayed cholecystectomy group ($P = 0.0065$), whereas only one case (0.35%) of biliary colic was documented in the early group ($P = 0.96$).

Hospital Readmission

Six cases of readmission were recorded in the delayed cholecystectomy group, whereas no readmissions occurred in the early intervention group ($P = 0.042$).

Mortality

No mortality was reported in either group.

Discussion

In terms of age and sex, both groups demonstrated comparable demographic characteristics and associated medical conditions, with no statistically significant differences.

Surgeons acknowledge the challenges associated with inflammatory effects following an acute pancreatitis episode, and the optimal timing for cholecystectomy remains a subject of debate. Previous research has reported that during the waiting period prior to cholecystectomy, there is a significant risk of developing biliary lithiasis-related complications, ranging from 13% to 44% [5]. In our study, biliary event-related complications were markedly more frequent in the delayed cholecystectomy group (Group 2) compared with the early cholecystectomy group (Group 1) ($P < 0.001$).

Conversely, a meta-analysis including 45 studies found no significant differences in postoperative complications when comparing early versus delayed cholecystectomy [6]. In contrast, our findings demonstrated a statistically significant difference in the recurrence of biliary events between the intervention groups ($P = 0.010$). The delayed cholecystectomy group presented nine cases (3.43%), whereas the early cholecystectomy group reported only one episode of biliary colic (0.35%) ($P = 0.0065$).

A recent meta-analysis demonstrated that delaying laparoscopic cholecystectomy beyond 48 hours after hospital admission was associated with a statistically significant increase in the incidence of major adverse events and readmission rates within 30 postoperative days [8]. When comparing hospital readmission outcomes in our study, early surgical intervention was associated with a greater reduction in this indicator ($P = 0.042$). Patients in the delayed cholecystectomy group experienced significantly higher readmission rates, primarily due to recurrent biliary pancreatitis or cholecystitis during the waiting period. Early cholecystectomy not only reduced these risks but also facilitated faster recovery and improved patient quality of life by preventing recurrence of biliary events.

In a study including 150 patients, only minor complications were reported, with no differences in mortality between early and delayed surgical timing [9]. Consistent with these findings, no mortality was observed in either group in our study, indicating no association between timing of surgery and mortality outcomes.

Conclusion

In conclusion, early cholecystectomy demonstrates more favorable postoperative outcomes compared with delayed intervention, particularly regarding the reduction of complications, length of hospital stay, and readmission rates. Early surgical management is established as a safe and effective approach for patients with mild biliary pancreatitis, aligning with current clinical trends favoring earlier intervention to reduce associated morbidity.

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Ethical Considerations

Protection of human subjects and animals. The authors declare that all procedures adhered to the ethical standards of the institutional review board and followed the principles outlined in the World Medical Association's Declaration of Helsinki. All procedures were authorized by the Institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. This study does not involve identifiable patient data and therefore does not require informed consent or additional ethics approval. The SAGER guidelines are not applicable. Statement on the use of artificial intelligence. The authors declare that artificial intelligence tools were used to support the writing and editing of this manuscript (ChatGPT, reference formatting assistance).

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